

## REMARKS

### **I. STATUS OF THE APPLICATION**

Claims 16-35 are pending in the application.

Claims 16-18, 21 and 27 were rejected under 35 U.S.C. §102(e).

Claims 19, 20, 22-26 and 28-35 were rejected under 35 U.S.C. §103(a).

Claim 16 is the only independent claim.

### **II. AMENDMENTS**

Claim 16 has been amended to require that: the lead plate is welded to the external case by an energy beam externally applied to the external case; and the surface area of the inwardly protruding projection on the inner surface of the external case is smaller than the welding surface area of the lead plate.

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. The attached page is captioned "**VERSION WITH MARKINGS TO SHOW CHANGES MADE**".

No new matter has been added.

### **III. CLAIMS 16-18, 21 AND 27 ARE NOVEL WITHIN THE MEANING OF 35 U.S.C. § 102(e) OVER KUROKAWA ET AL. BECAUSE THE APPLIED PRIOR ART FAILS TO TEACH THAT THE SURFACE AREA OF THE INWARDLY PROTRUDING PROJECTION IS SMALLER THAN THE WELDING SURFACE AREA OF THE LEAD PLATE**

Claims 16-18, 21 and 27 were rejected under 35 U.S.C. § 102(3) as being anticipated by Kurokawa et al. ("Kurokawa"), as described in paragraph 2 of the Office Action.

Applicants respectfully submit that claims 16-18, 21 and 27, as amended, are novel within the meaning of 35 U.S.C. § 102(e), over Kurokawa, for the following reasons.

As described in the Background of the Invention in the present application, a prior art battery fabrication technique includes inserting an electrode rod in the middle of a spirally shaped electrode assembly in order to electrically weld a lead plate to an external case. Such a technique is described, for example, with respect to Fig. 1, and the related text. The problems associated with this technique include a decrease in the battery's capacity, resulting from the space taken by the center electrode rod.

Another prior art battery fabrication technique overcame the problem discussed above, by laser welding the lead plate to the bottom of an external case, for example as illustrated in Fig. 2, and described in the related text in the Background of the Invention of the present application. However, a problem associated with the prior art laser welding technique arose when the lead plate became separated from the bottom surface of the external case at a point where the energy beam was applied for welding. Specifically, when the energy beam was applied to the outside of the external case, it was not visually apparent whether the lead plate was in fact contacting the external case at the point where the laser was incident upon the external case. Consequently this prior art laser welding technique did not provide a reliable weld.

The present invention overcomes the shortcomings associated with both prior art battery fabrication techniques. In particular, the present invention provides a projection which projects from the inner surface of the external case thereby contacting the lead plate. Furthermore, an inwardly protruding recess is located on the outer surface of the external case so as to correspond with the inwardly protruding projection of the external case so that the area of contact of the external case and the lead plate can easily, and visually be determined. The inwardly protruding projection on the external case has a smaller surface area than the surface area of the lead plate, with which it is in contact, for example, as depicted in Fig. 3. Consequently, a welding laser is applied to a specific area of the external case, i.e., at the inwardly protruding recess, thereby insuring that the area of the weld will correspond to the area where the external case is in contact with the lead plate.

Claim 16 recites *inter alia*, a battery comprising an electrode assembly, an external case having an inwardly protruding projection that has a first surface area, a lead plate having a welding surface area and:

wherein said lead plate is welded to said external case by an energy beam externally applied to said external case; and

wherein said first surface area is smaller than said welding surface area.

Kurokawa fails to teach at least the above-identified limitations.

Paragraph 2 of the Office Action asserts that terminal plate 79 is a “lead plate,” which is “welded at point ‘A’ to a projection jutting from the inner bottom surface of the external case.” Paragraph 2 of the Office Action then asserts that “the bottom portion of the case which extends inward from the two endpoints shown near reference character ‘82 is defined as the projection (recess).”

As depicted for example in Fig. 1 of Kurokawa, cap 82 has an inner surface that has a corresponding surface area. Internal terminal plate 79 has a particularly bent shape and a particular placement, so as to be in contact with a portion the inner surface of cap 82. The area of contact between internal terminal plate 79 and the inner surface of cap 82 is within an area that is smaller than the area bounded by groove 85 in cap 82. Consequently, the area for which internal terminal plate 79 and the inner surface of cap 82 can be welded, is equal to the area of contact between the two, which is the entire surface of cap 82 within the area bounded by groove 85. In other words, the welding surface area of the lead plate in the battery of Kurokawa is within the area bounded by groove 85.

However, the inner surface area of cap 82 extends beyond the area bounded by groove 85. For this reason, the welding surface area of the lead plate of the battery of Kurokawa is smaller than the inner surface area of cap 82. In other words, in the battery of Kurokawa, the inner surface area of cap 82 is larger than the welding surface area of the terminal plate of the battery. Such a teaching is opposite to that of claim 16, which requires that the surface area of the inward protruding projection of the external case be smaller than the welding surface area of the lead plate of the battery.

As pointed out in paragraph 2 of the Office Action, the projection of Kurokawa may be seen as the entire concave portion of the bottom of the battery case. Therefore, similar to the prior art battery fabrication techniques discussed in the Background of the Invention in the present application, in the battery of Kurokawa, it is not visually apparent whether the terminal plate 79 is contacting the cap 82 at the point of an attempted weld. Even though welding point A is at the center of plate 79 and cap 82, if any gaps or voids occur at point A, defective welding could occur. In particular, since plate 79 and cap 82 are planar, if the plate 79 and cap 82 are incorrectly positioned so as not to be in parallel contact with each other, then plate 79 and cap 82 will not be in contact with each other at point A. In such an event, defective welding could occur.

Additionally, the welding point A of Kurokawa is a welding mark produced by resistance welding. This is evident because welding point A is located at the border surface of plate 79 and cap 82. This is consistent with resistance welding, wherein a weld occurs at a border surface because resistance is high. Therefore, the battery of Kurokawa does not teach or suggest that which is required by claim 16, namely that the lead plate is welded to the external cast by an energy beam externally applied to the external case.

As anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed in a prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986), based on the foregoing, it is clear that Kurokawa does not anticipate claim 16.

Furthermore, since claims 17, 18, 21 and 27 are dependent upon claim 16, and therefore include all the limitations thereof, Applicants submit that claims 17, 18, 21 and 27 additionally are not anticipated by Kurokawa.

In view of the above remarks, Applicants respectfully submit that claim 16 is not anticipated by Kurokawa, and urge that the rejection of claim 16, and its dependent claims 17, 18, 21 and 27, under 35 U.S.C. § 102(e), be withdrawn.

**IV. CLAIMS 19, 20, 22-26 AND 28-35 ARE PATENTABLE WITHIN THE MEANING OF 35 U.S.C. § 103(a) OVER THE APPLIED PRIOR ART BECAUSE THE APPLIED PRIOR ART FAILS TO TEACH THAT THE SURFACE AREA OF THE INWARDLY PROTRUDING PROJECTION IS SMALLER THAN THE WELDING SURFACE AREA OF THE LEAD PLATE**

Claims 22 an 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kurokawa as described in paragraph 3 of the Office Action. Claims 19, 20, 23, 24 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kurokawa in view of Machida et al. ("Machida"), as described in paragraph 4 of the Office Action. Claims 23-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kurokawa in view of Omaru et al. ("Omaru"), as described in paragraph 5 of the Office Action. Claims 29-33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kurokawa in view of Dorogi et al. ("Dorogi"), as described in paragraph 6 of the Office Action. Claims 34 and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kurokawa in view of Hartmann et al. ("Hartmann"), as described in paragraph 7 of the Office Action.

Applicants respectfully submit that claims 19, 20, 22-26 and 28-35 are patentable within the meaning of 35 U.S.C. § 103(a), for the following reasons.

Claims 22 and 28 are dependent upon claim 16, and thereby include all of the limitations thereof. Applicants therefor respectfully submit that claims 22 and 28 are patentable over Kurokawa for the reasons as described above in Section III.

Claims 19, 20, 23, 24 and 26 are dependent upon claim 16, and therefor include all of the limitations thereof. Applicants therefor respectfully submit that claims 19, 20, 23, 24 and 26 are patentable over Kurokawa for the reasons as described above in Section III. Furthermore, paragraph 4 of the Office Action indicates that Kurokawa does "not explicitly teach that the external case is rectangular or elliptical or that the spiral electrode assembly is elliptical." Machida is therefor relied upon for a teaching of a "battery comprising a rectangular or elliptical external case and an elliptical electrical body."

Machida fails to provide a teaching or suggestion that would have obviated the shortcoming of Kurokawa, in such a manner as would render obvious claims 19, 20, 23, 24 and 26. In particular, Machida does provide a teaching or suggestion of an external case having an inwardly protruding

projection on its inner surface or an inwardly protruding recess on its external surface.

For the reasons as discussed above, Applicants respectfully submit that claims 19, 20, 23, 24 and 26 are patentable within the meaning of 35 U.S.C. § 103(a) over the combination of Kurokawa in view of Machida.

Claims 23-25 are dependent upon claim 16, and therefore include all of the limitations thereof. Applicants therefore submit that claims 23-25 are patentable over Kurokawa for the reasons as described above in Section III. Furthermore, paragraph 5 of the Office Action states that Kurokawa does "not explicitly teach that the external case is rectangular or that the electrode assembly comprises stacked planar electrodes and separators. The Office Action therefor relies upon a teaching of Omaru for "a rectangular battery comprising electrode assembly having stacked planar electrodes and separators."

Omaru fails to find a teaching or suggestion that would have obviated the shortcomings of Kurokawa, in such a manner as would render obvious claims 23-24. In particular, Omaru fails to teach or suggest an external case whose inner surface has an inwardly protruding projection and whose outer surface has an inwardly protruding recess.

For the reasons as discussed above, Applicants respectfully submit that claims 23-25 are patentable within the meaning of 35 U.S.C. 103(a) over the combination of Kurokawa in view of Omaru.

Claims 29-33 are dependent upon claim 16, and therefor include all of the limitations thereof. Applicants therefor respectfully submit that claims 29-33 are patentable over Kurokawa for the reasons as discussed above in Section III. Furthermore, paragraph 6 of the Office Action indicates that Kurokawa does "not explicitly teach that the lead plate has a flexible portion in the center which is surrounded by holes having projecting portions which make contact with the electrode assembly." The Office Action therefor relies upon a teaching of Dorogi, for a "disk-shaped lead plate for a battery comprising a flexible projecting portion (76) which electrically contacts the external terminal, and circular projections (80) which make contact with the electrode assembly."

Dorogi fails to provide a teaching or suggestion that would have obviated the shortcomings of Kurokawa, in such a manner as would render obvious claims 29-33. In particular, Dorogi fails to teach or suggest an external case whose inner surface has an inwardly protruding projection, and whose outer surface has an inwardly protruding recess.

For the reasons as discussed above, Applicants respectfully submit that claims 29-33 are patentable within the meaning of 35 U.S.C. § 103(a) over the combination of Kurokawa in view of Dorogi.

Claims 34 and 35 are dependent upon claims 16, and therefor, include all of the limitations thereof. Applicants therefor submit that claims 34 and 35 are patentable over Kurokawa for the reasons as described above in Section III. Furthermore, the Office Action states that Kurokawa does "not explicitly teach that an electrically conductive, ant-corrosive coating is applied to an outside surface the external case." The Office Action therefor relies on Hartmann for a teach of "a battery comprising an external case having an outer coating of an anti-corrosive silicate or oxide."

Hartmann fails to provide a teaching or suggestion that would have obviated the shortcomings of Kurokawa, in such a manner as would render obvious claims 34 and 35. In particular, Hartmann fails to teach or suggest a battery having an external case, having an inner surface which includes an inwardly protruding projection and an outer surface which includes an inwardly protruding recess.

For the reasons as discussed above, Applicants respectfully submit that claims 34 and 35 are patentable within the meaning of 35 U.S.C. § 103(a) over the combination of Kurokawa in view of Hartmann.

In view of the above remarks, Applicants respectfully submit that claims 19, 20, 22-26, 28-35 would not have been obvious over the cited prior art, and urge that the rejection of claims 19, 20, 22-26 and 28-35 under 35 U.S.C. § 103(a) be withdrawn.

V. **CONCLUSION**

Having fully and completely responded to the Office Action, Applicants submit that all of the claims are now in condition for allowance, an indication of which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

Respectfully submitted,

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